CARE AND MAINTENANCE GUIDE FOR ANALYTICAL INSTRUMENTATION

GUIDANCE NOTES

Always read the manufacturer's operating instructions included with the instrument.

- Physical damage
- Heat or Cold
  i.e strong sunlight or freezing conditions
- Solvents
- Vibration
- Total immersion (unless indicated as IP67)

Various calibration/buffer solutions are available for the regular calibration of instruments.

PH ELECTRODE MAINTENANCE

The pH probe consists of two parts: a pH electrode and a reference electrode. The pH electrode is a hydrogen ion sensitive glass bulb, with an output voltage that varies with the changes in the relative hydrogen ion concentration inside and outside the bulb. The reference electrode is the liquid junction to complete the measuring circuit with the pH glass bulb. It comprises a coated wire, a filling solution and a permeable junction through which the filling solution escapes to form the liquid bridge.

It is essential that the electrode must always be clean. Rinsing with distilled water will often suffice for aqueous solutions. Rinsing the electrode with a mild detergent solution followed by thorough rinsing with deionised water once a week will be beneficial. An alkaline hypochlorite solution can be used to clean electrode membranes subjected to solutions containing fat or proteins.

Between measurements, store the electrode bulb in a pH buffer of 4 pH, or de-ionised water. High temperature measurements, compounded by constant use in strong alkaline solutions or weak solutions of hydrofluoric acid will drastically reduce the lifetime of the electrode.

With replaceable electrodes, trapped air bubbles around the inner reference electrode will produce an unstable reading. Swing the electrode in an arc or tap it gently to remove the bubbles. The electrode may have to be heated gently to approximately 60 °C in a water bath if the air bubbles are trapped by KCl crystals.

If the electrode has been allowed to dry out, has become slow to respond or cannot be calibrated, it may be rejuvenated. To rejuvenate electrodes should be soaked overnight in 0.1 M HCl. After overnight soaking, rinse with water, then soak in a buffer of 4 pH, before finally again rinsing with water, the electrode should then be ready for use. If a shorter soaking time is necessary, the electrode should be calibrated frequently to adjust for drifting potentials.

A number of factors dictate the useful lifetime of the pH electrode. High temperatures, frequent measurements in alkaline solutions, and improper maintenance will reduce the electrode's lifetime, whereas proper maintenance will prolong the useful lifetime. The pH electrode will, however, deteriorate gradually even when stored dry. A standard electrode, will usually last for 12 months or approximately 365 uses.

REFERENCE ELECTRODE CARE

The reference electrode must also be kept clean. In general, most electrode problems can be traced back to the reference electrode. Cleaning and rinse solutions are the same as for the glass electrode.

CALIBRATION

By providing good maintenance care to the electrodes, proper calibration should be able to be performed easily. If there is a continued problem, the electrodes should be replaced or examined again.

When performing a calibration with two buffers, stability should occur within approximately one minute in each case. The zero point and sensitivity should be written down after each calibration since a large deviation from one calibration to the next indicates a problem.

CONDUCTIVITY ELECTRODE MAINTENANCE

The ETI range of Conductivity Meters include TDS Testers, Nutrient Tester and Conductivity Meters.

Various calibration solutions are available for the regular calibration of instrument.

Storage

It is best to store units so that the electrodes are immersed in deionised water. Any unit that has been stored dry should be soaked in distilled water for 5 to 10 minutes before use to assure complete wetting of the sensing elements.

The single most important requirement of accurate and reproducible results in mconductivity measurement is clean sensing elements. Dirty sensing elements will contaminate the solution and cause the conductivity to change. Grease, oil, fingerprints, and other contaminants on the sensing elements can cause erroneous measurements and sporadic responses.

Electrodes can be cleaned using a mixture of 1 part by volume of isopropyl alcohol, 1 part of ethyl ether, and 1 part of HCl (1+1). After cleaning, thoroughly flush the cell with water. If the old platinum black coating to be removed, judicious application of aqua regia to the electrodes, or electrolysis in HCl is frequently successful. This should only be attempted by trained operatives.

Electrodes can also be cleaned with detergent and/or nitric acid (1%) by dipping or filling the cell with cleaning solution and agitating for two or three minutes. Rinse the cell several times with distilled or deionised water and remeasure the cell constant before use.

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